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Application of Positron emission tomography/computed tomography (PET/CT) to assess regional cardiac function and metabolism in models of pathological and physiological hypertrophy

Project Description:

Most cardiovascular diseases often lead to heart failure (HF) and is the leading cause of mortality in the western world. Cardiac hypertrophy refers to an increase in heart size and is associated with nearly all forms of heart failure. Cardiac hypertrophy can be induced by pathological stimuli (e.g., pressure or volume overload) or physiological stimuli (e.g., developmental growth, exercise training). The development of cardiac fibrosis is typically strongly associated with pathological cardiac remodelling but not physiological cardiac enlargement. In disease models, cardiac structural remodelling is a consequence of increased interstitial fibrosis with cardiac structural alterations. Cardiac remodelling is associated with numerous biochemical and functional changes in the myocardium. Heart size alone is insufficient to provide mechanistic information about the myocardium itself, and an increase in heart size is not necessarily associated with cardiac dysfunction. Therefore, assessment of cardiac function and metabolism plays a fundamental role in differentiating physiological heart growth from pathological heart growth.

In the past, cardiac imaging in mice was very difficult, due to the small size of the heart and high heart rate. The use of molecular imaging in preclinical cardiovascular research has become possible because of advances in imaging techniques. At present, non-invasive in vivo imaging techniques such as 18F-fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) can facilitate assessment of regional cardiac function and metabolism in mice. Our study is aiming to assess the capability of PET/CT to identify the metabolic difference between physiological and pathological cardiac hypertrophy in mouse models by visually and quantitatively determining FDG activity in the heart wall.

Primary Supervisor: Dr Yi Ching (Peggy) Chen

Primary Supervisor Contact: peggy.chen@baker.edu.au

Project Site: Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

Honours places available: 1

Master of BioMed places available: 1

Atrial adaptations in physiological and pathological cardiac hypertrophy

Project Description:

Atrial fibrillation (AF) is the most common rhythm disorder of the heart, and is characterised by the high frequency excitation of the atrium, leading to dyssynchronous contraction of the atria and irregular excitation of the ventricles. AF has been reported to affect 1-4% of the general population worldwide, but this is likely to be an under representation because many people remain undiagnosed. Thus, it is important to understand the underlying mechanisms of AF for further development of novel therapeutic strategies.
One of the key features of AF is atrial enlargement but the critical mechanisms are mostly unknown. Research has previously focused on understanding the growth of the ventricles, and has identified the differences between pathological and physiological ventricular growth. In contrast, differences in growth of the atria and underlying mechanisms of atrial enlargement in both pathological and physiological setting are poorly understood.

The key aim of this project is to characterise the atria from physiological and pathological cardiac hypertrophy mouse models. The characterisation will include functional, morphological, histological and molecular analyses. Results from this project are expected to lead to the identification of new drug targets and strategies for AF.

**Primary Supervisor:** Prof Julie McMullen

**Primary Supervisor Contact:** julie.mcmullen@baker.edu.au

**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

**Honours places available:** 1

**Master of BioMed places available:** 1

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Exploring the contribution of intrinsic lipids to immune cell development and function

**Project Description:**

This project is focused on exploring how unique lipid signatures (lipidomes) of immune cells influence their function and/or development. The overarching goal is to identify ways to manipulate specific lipids to alter cell function in disease.

Over the past few years we have generated a new and exciting data set profiling the lipid compositions (lipidome) of 16 different human immune cells and the major mouse immune cell equivalents. This revealed striking diversity between various immune cells, particularly between the innate and adaptive immune system.

We are now exploring two overall questions: 1. Do specific lipids drive immune cell function? 2. How do the lipidomes of immune cells form as they develop from stem cells.

The specific project can be focused on either of the two questions above.

**Project 1:** Exploring the contribution of lipids sensitive to peroxidation which confer susceptibility to a specific form of cell death known as ferroptosis.

**Hypothesis:** Immune cells enriched in lipids that are sensitive to peroxidation undergo ferroptosis when exposed to ferroptotic agonists, while immune cells devoid in these lipids will be resistant.

This project will involve manipulating human and mouse immune cells in culture. Techniques to explore this question will be cell death assays via flow cytometry and assessment of lipid peroxidation by mass spectrometry. Mouse models will also be used to test this hypothesis in vivo and depending on the applicant (hons/PhD) will use mouse models to genetically modify the lipid composition or ferroptotic pathway of specific immune cells.

**Project 2:** Determining the contribution of particular lipids to immune cell development.

**Hypothesis:** Specific lipids are critical to the development of immune cells
This project will determine the lipidomes of haematopoietic stem cells and how they change as these cells mature down specific lineages to form mature immune cells. Given we have identified a very unique signature in blood neutrophils (i.e. an enrichment in ether lipids), this project will first explore what happens when we delete an enzyme called glyceronephosphate O-acyltransferase (GNPAT – rate limiting enzyme for the production of ether lipids) specifically in stem cells and explore the neutrophil maturation pathway in the bone marrow and blood. We will also explore some functional properties of neutrophils such as inflammatory signalling in response to bacterial stimuli and phagocytosis. These experiments will be conducted in mice using flow cytometry to quantify cell population and examine the functional readouts.

**Primary Supervisor:** Prof Andrew Murphy

**Primary Supervisor Contact:** andrew.murphy@baker.edu.au

**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

**Honours places available:** 1

**Master of BioMed places available:** 1

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Development of innovative anti-inflammatory drugs

**Project Description:**

We introduced a novel concept of the functional role of CRP as a ‘pro-inflammatory agent’. This concept is based on our findings that pentameric (p)CRP can undergo a conformational change to monomeric (m)CRP, which is highly pro-inflammatory and pro-coagulant, and induces a localised inflammatory reaction that aggravates many diseases. We have shown that pCRP to mCRP dissociation occurs on the surface of ‘stressed cells’ such as activated necrotic or apoptotic cells, and on microparticles (MPs) circulating in blood. For example, the surface of activated platelets causes a rapid dissociation of pCR to mCRP. We have also described mCRP formation induced by misfolded proteins, such as Alzheimer’s plaques, as a clearance mechanism that can ‘overshoot’ in pathological situations. We are now developing inhibitors of CRP dissociation that can form the basis of a novel therapeutic approach for a range of inflammatory diseases including atherosclerotic plaque instability and autoimmune diseases. The project will focus on atherosclerosis, stroke and Alzheimer’s disease.

**Primary Supervisor:** Prof Karlheinz Peter

**Primary Supervisor Contact:** Karlheinz.Peter@unimelb.edu.au

**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

**Honours places available:** 1

**Master of BioMed places available:** 1

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PET imaging of activated platelets as an early diagnostic tool for cardiovascular disease and cancer

**Project Description:**

Positron Emission Tomography (PET) imaging is widely used clinically as a highly advanced medical imaging tool. It allows for non-invasive detection of various diseases such as cancer by using small
amounts of positron-producing radioisotopes. A gap that remains in this field is the development of a universal agent sensitive enough to detect areas affected by inflammatory diseases, such as atherosclerosis, tumours and their metastases. In recent years, studies have demonstrated the presence and importance of activated platelets in various inflammatory diseases including atherosclerosis, myocardial infarction, and cancer. In the Atherosclerosis lab, we have developed a single-chain antibody which only targets and binds to activated platelets present in atherosclerosis and in the tumour micro-environment. We aim to design a novel PET tracer using copper-64, fused with the single-chain antibody which targets activated platelets for molecular imaging of atherosclerosis, cancer, and most importantly small metastases, which are often difficult to detect.

**Primary Supervisor:** Prof Karlheinz Peter  
**Primary Supervisor Contact:** Karlheinz.Peter@unimelb.edu.au  
**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health  
**Honours places available:** 1  
**Master of BioMed places available:** 1

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**Diagnosis and therapy of cancer, inflammatory and thrombotic diseases**

**Project Description:**

Activated platelets have been shown to play an important role in cancer, inflammation and thrombotic diseases. This project would focus on Glycoprotein (GP) IIb/IIIa, which plays an important role in the aggregation of platelets. GPIIb/IIIa is the most abundant platelet receptor; it undergoes a change in confirmation when activated. For this reason, this molecule has been chosen as the target epitope for molecular imaging. The use of small recombinant antibodies for diagnostic molecular imaging and targeted drug delivery are well-established in our lab. We propose to conjugate activated GPIIb/IIIa targeting recombinant antibodies to different contrast agents for their respective imaging modality. These recombinant antibodies can be used for diagnostic imaging as well as targeted delivery of pharmacological treatment. Our group has access to a variety of clinically available imaging modalities, including Magnetic Resonance Imaging (MRI), ultrasound, Computed Tomography (CT) and Positron Emission Tomography (PET), as well as the latest preclinical scanners, such as new 19-Flourine MRI technology and 3D Fluorescence Emission Computed Tomography (FLECT). This project aims to investigate activated platelet-targeted contrast agents for detection of inflammation, cancer and/or thrombosis using molecular imaging, thereby providing better diagnostic technology. By harnessing the targeting ability of the antibodies, we can then conjugate drugs onto them for side-effect-free, targeted drug delivery.

**Primary Supervisor:** Prof Karlheinz Peter  
**Primary Supervisor Contact:** Karlheinz.Peter@unimelb.edu.au  
**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health  
**Honours places available:** 1  
**Master of BioMed places available:** 1

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**Developing gold nanoparticles for CT imaging of cardiovascular disease**
Computed Tomography (CT) allows for the cutting-edge use of non-invasive anatomical imaging of the human body, and is commonly used to diagnose cardiovascular disease. However, CT has two main limitations: limited soft-tissue contrast and the lack of molecular readout. In recent years, the development of gold nanoparticles (GNRs) as CT contrast agents has gained significant attention, with a specific focus on overcoming these limitations. The unique properties of GNRs, such as high X-ray attenuation, easy synthesis, and most importantly the ability to incorporate targeted photothermal therapy to imaging, make it an attractive agent for molecular imaging. Activated platelets are known to play a major role in the pathogenesis of atherosclerosis and ischaemia/reperfusion injury after myocardial infarction. In the Atherothrombosis and Vascular Biology laboratory, we have developed a single-chain antibody that only targets and binds to activated platelets present in areas of disease, but does not bind to resting circulating platelets. We aim to design activated platelet-targeted GNRs for molecular imaging of atherosclerosis and myocardial infarction. Further on, we aim to develop a theranostic agent by incorporating photothermal therapy or a therapeutic drug to the activated platelet-targeted GNRs for localised therapy, whilst ensuring limited systemic side effects.

Primary Supervisor: Prof Karlheinz Peter

Primary Supervisor Contact: Karlheinz.Peter@unimelb.edu.au

Project Site: Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

Honours places available: 1

Master of BioMed places available: 1

Activated platelets targeted drug therapy

Project Description:

Developing a novel targeted fibrinolytic drug that is directed against activated platelets. Fibrinolysis is a valuable alternative for treating myocardial infarction when an invasivesurgical procedure is not available in a timely fashion.

Primary Supervisor: A/Prof Xiaowei Wang

Primary Supervisor Contact: xiaoweiw@unimelb.edu.au

Project Site: Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

Honours places available: 1

Master of BioMed places available: 1

Developing nanoparticles for targeted theranostics delivery of drug and gene therapeutics

Project Description:

Research in the Molecular Imaging and Theranostics lab focus on translational research that links the findings from basic science to the practical applications that enhance human health and well-being in clinical settings. Developing new bio-compatible nanoparticles that can be used for targeted
delivery and localize the drugs/genetic therapy to the site of disease, thereby eliminating reduce side effects.

**Primary Supervisor:** A/Prof Xiaowei Wang  
**Primary Supervisor Contact:** xiaoweiw@unimelb.edu.au  
**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health  
**Honours places available:** 1  
**Master of BioMed places available:** 1

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**mRNA therapy for cardiovascular diseases**  
**Project Description:**  
mRNA therapy has attracted major interest after the success of COVID-19 vaccination; we are designing and testing new mRNA therapeutics to be delivered via lipid nanoparticles for the transfection of endothelial cells and thus the treatment of cardiovascular diseases.

**Primary Supervisor:** A/Prof Xiaowei Wang  
**Primary Supervisor Contact:** xiaoweiw@unimelb.edu.au  
**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health  
**Honours places available:** 1  
**Master of BioMed places available:** 1

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**Validation of 4D Flow with Exercise using CMR**  
**Project Description:**  
Cardiac magnetic resonance imaging (CMR) is a powerful tool for assessing heart function. Advanced CMR techniques include functional assessment during exercise, and three dimensional flow assessment over the cardiac cycle. We aim to assess the validity of 4D flow during exercise, at low, medium and high intensity in a group of trained athletes.

**Primary Supervisor:** Dr Ben Costello  
**Primary Supervisor Contact:** ben.costello@baker.edu.au  
**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health  
**Honours places available:** 1  
**Master of BioMed places available:** 1

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**Do short chain fatty acids prevent gut leakiness and enhanced haematopoiesis induced by a high salt diet?**  
**Project Description:**
Our laboratory has discovered that a high salt diet promotes a breakdown of the intestinal barrier in the gut which causes activation of the immune system and changes within the bone marrow microenvironment, altering blood production. This project will explore the hypothesis that supplementation of butyrate, an anti-inflammatory short chain fatty acid, will prevent high salt diet-induced gut leakiness, immune cells activation and protect the bone marrow microenvironment from being destructed. This will allow for the retention of haematopoietic stem cells and normal blood production. This project will employ a variety of assays and experimental readouts to address this hypothesis and give the student a valuable insight into immune and stem cell biology within a highly successful world class research laboratory.

**Primary Supervisor:** Prof Andrew Murphy

**Primary Supervisor Contact:** andrew.murphy@baker.edu.au

**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

**Honours places available:** 1

**Master of BioMed places available:** 1

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Exploring how a high salt diet promotes bone destruction through immune cell activation

**Project Description:**

Diets rich in salt have been linked to bone pathologies. This has generally been attributed to mineral exchange, causing weaker bones. However, our group hypothesized that this process is biologically driven. We have made initial discoveries to show that specific immune cells are produced and activated by a high salt diet that is linked with bone destruction. This project will focus on the novel mechanisms contributing to this discovery. Specifically, this project will determine how the immune cells interact and activate osteoclasts within the bone and will explore where these immune cells are first activated. We anticipate these findings being important across several age groups and will explore ways to offset these detrimental effects of high salt intake. The student will be exposed to a world class research environment and cutting-edge techniques, with excellent supervision. Techniques will include flow cytometry, sectioning of tissues (including bones), immunofluorescence, micro CT and multiphoton microscopy.

**Primary Supervisor:** Prof Andrew Murphy

**Primary Supervisor Contact:** andrew.murphy@baker.edu.au

**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

**Honours places available:** 1

**Master of BioMed places available:** 1

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Exploring how diabetes causes increased proliferation of haematopoietic stem cells carrying a mutation in DNMT3A

**Project Description:**

Clonal haematopoiesis of indeterminant potential (CHIP), caused by somatic mutations in haematopoietic stem cells (HSCs) causes a growth advantage in these cells causing them to
outcompete non-mutated HSCs. CHIP was commonly thought to be a prerequisite to leukaemia, the disease ultimately responsible for death in these individuals. However, it was recently shown that people with CHIP more frequently die of cardiovascular disease. Interestingly, there is an association with CHIP and diabetes, but this has not been explored experimentally. We discovered that diabetes enhances the proliferation of HSCs carrying the most common mutation in CHIP (DNMT3A). This project will explore mechanism behind this using a variety of unique animal models and experimental techniques. This project will give the student a valuable insight into stem cell biology within a highly successful world class research laboratory.

**Primary Supervisor:** Prof Andrew Murphy

**Primary Supervisor Contact:** andrew.murphy@baker.edu.au

**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

**Honours places available:** 1

**Master of BioMed places available:** 1

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**Immunity, Chronic Inflammation and Cardiovascular Disease**

**Project Description:**

Atherosclerosis is a disease characterised by the formation of chronically inflamed lipid laden plaques in medium and large arteries, such as those that supply the heart and brain with blood. The rupture of these plaques causes blood clots which can block these arteries, and is the primary cause of myocardial infarction (heart attacks), strokes, and the majority of cardiovascular disease mortality. Despite recognition that inflammation is a key feature of atherosclerosis and the most likely cause of plaque rupture, it is not fully understood what drives the chronicity of pro-atherosclerotic immune responses. With a particular focus on the adaptive immune system (T&B cells); we aim to deeply characterise the immune landscape in atherosclerosis using state-of-the-art technologies, identify the causes of immune dysregulation and chronic atherosclerotic inflammation and define the role these pathways play in the development and outcome of cardiovascular disease.

**Primary Supervisor:** Prof Karlheinz Peter

**Primary Supervisor Contact:** karlheinz.peter@unimelb.edu.au

**Project Site:** Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

**Honours places available:** 0

**Master of BioMed places available:** 1

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**Mechanotransduction in blood cells and consequences for thrombosis and inflammation**

**Project Description:**

This project will determine the effects of blood flow on immune cell function and identify receptors that control such effects. This project will study the effect of shear stress and mechanotransduction in blood cells such as platelets and various immune cells to identify specific mechanoreceptors responsible for the regulation of monocyte adhesion, activation and inflammatory responses, and ultimately atherosclerotic plaque formation and instability/rupture. Shear stress associated with
blood flow is a major determinant of vascular function and homeostasis. Different degrees of mechanical stress and blood flow dynamics regulate different aspects of immunity, cellular adhesion and migration, which are essential for the development of atherosclerosis, as well as in adaptive and innate humoral immunity. How changes in shear stress control immune responses is an emerging area of research, however, definitive evidence showing that immunity is subject to the mechanical forces resulting from blood flow is lacking. The aim of this project is to elucidate the mechanosensory complexes that are mediating the cellular responses to blood flow dynamics at both physiological as well as pathological levels. This will be achieved through the use of advanced imaging techniques, microfluidics, animal models and clinical samples.

Primary Supervisor: Prof Karlheinz Peter

Primary Supervisor Contact: karlheinz.peter@unimelb.edu.au

Project Site: Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

Honours places available: 0

Master of BioMed places available: 1

Exploring the therapeutic potential of protein phosphatases in cardiometabolic disease

Project Description:

Protein phosphorylation is a post-translational modification that switches proteins on and off to control cellular processes such as growth, survival and energy metabolism. Dysregulation of phosphorylation contributes to maladaptive cardiac remodelling and dysfunction in settings of cardiometabolic disease, including heart failure, and represents a potential target for therapeutic intervention. Research has identified numerous protein kinases that are activated in settings of cardiac stress and injury and which contribute to the development of heart failure. However, the development of therapies targeting protein kinase activity have so far failed to translate into the clinic. Targeting protein phosphatases, which counteract kinase activity by dephosphorylating proteins, represents an alternative approach for manipulating protein phosphorylation in settings of heart disease. However, there is a knowledge gap concerning the function of specific protein phosphatases in regulating cardiac physiology and pathophysiology in settings of disease.

Student projects are available which will explore the function of cardiac protein phosphatases using pharmacological and genetic interventions in cell culture models. There may also be scope for conducting proof-of-concept studies using novel therapeutic compounds in in vivo models of cardiometabolic disease.

Primary Supervisor: Dr Kate Weeks

Primary Supervisor Contact: kate.weeks@baker.edu.au

Project Site: Baker Heart and Diabetes Institute, Department of Cardiometabolic Health

Honours places available: 1

Master of BioMed places available: 1

Development of novel point-of-care diagnostics tests and surveillance tools for malaria
Burnet Institute

Project Description:
There is an urgent need for diagnostic and surveillance tests that could be used in clinical settings and rural and remote communities. This project will work towards the development of novel semi-quantitative rapid tests for assessing malaria exposure and transmission in communities.

Primary Supervisor: Prof James Beeson
Primary Supervisor Contact: james.beeson@burnet.edu.au, chrissie.collins@burnet.edu.au
Project Site: Burnet Institute
Honours places available: 1
Master of BioMed places available: 1

Development of novel vaccines against malaria
Project Description:
This project is suitable for a student with a keen interest in humoral and cellular immunology and vaccine development.

Primary Supervisor: Prof James Beeson
Primary Supervisor Contact: james.beeson@burnet.edu.au, chrissie.collins@burnet.edu.au
Project Site: Burnet Institute
Honours places available: 1
Master of BioMed places available: 1

Discovering the mechanisms and targets of immunity against malaria
Project Description:
Conduct immunologic assays to understand the mechanisms of protective immunity to malaria and identify key targets. This knowledge will be used to inform vaccine development.

Primary Supervisor: Prof James Beeson
Primary Supervisor Contact: james.beeson@burnet.edu.au, chrissie.collins@burnet.edu.au
Project Site: Burnet Institute
Honours places available: 1
Master of BioMed places available: 1

Healthy Mothers, Healthy Babies in Papua New Guinea – The impact of nutrition, malaria, and other infections on pregnant women and infants
**Project Description:**

In resource-poor regions globally, pregnant women experience high rates of malaria, under-nutrition, and viral and bacterial infections, which can lead to maternal morbidity and mortality and low birth weight in infants, which results in a large number of infant deaths each year. The objective of this project is to determine the major preventable causes of poor maternal health and low birth weight to enable the development of future interventions to improve health and pregnancy outcomes. This project is offered as a laboratory or epidemiological project, or a combination of the two depending on student interests.

**Primary Supervisor:** Prof James Beeson

**Primary Supervisor Contact:** james.beeson@burnet.edu.au, chrissie.collins@burnet.edu.au

**Project Site:** Burnet Institute

**Honours places available:**

**Master of BioMed places available:** 1

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**Developing novel antimalarial compounds active against Plasmodium spp. parasites**

**Project Description:**

Infection with malaria-causing Plasmodium parasites affects hundreds of millions of people per year, tragically resulting in half a million deaths annually. Parasite resistance has developed to all current antimalarial medicines, and there is an urgent need to develop novel compounds with new targets capable of killing drug-resistant parasites. This project will investigate Plasmodium Protein Disulfide Isomerases (PDIs) as novel antimalarial targets. Specifically, commercial PDI inhibitors active against Plasmodium parasites will be investigated, and the basic biology of Plasmodium PDI proteins will be elucidated.

**Primary Supervisor:** A/Prof Paul Gilson

**Primary Supervisor Contact:** paul.gilson@burnet.edu.au

**Project Site:** Burnet Institute

**Honours places available:** 1

**Master of BioMed places available:** 0

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**Epidemiology of neurological conditions in Australia**

**Project Description:**

Epidemiology of neurological conditions is evolving. Systematic approach to epidemiology is an essential stepping stone for studies evaluating impact of clinical and epidemiological intervention. This study will generate the much needed epidemiologic summary of neurological conditions, and will estimate the impact of the evolving epidemiology on the demand for specialist care. This is of particular importance at the time when human resources in Australian health care are limited. In the course of this project the student will learn and complete systematic search of literature, analysis of epidemiological data and will publish the results in the form of a peer-reviewed publication.
Musculoskeletal health in children prescribed antiseizure medications: a longitudinal study

Project Description:

It is widely thought that anti-epileptic drugs (AEDs) impair bone health outcomes in childhood, but there is a lack of prospective, longitudinal data to underpin this assertion. We propose to build on our previous cross-sectional studies by establishing a longitudinal cohort of young people taking AEDs and sibling controls. A student will assist in setting up the cohort, recruiting subjects and controls, and overseeing study-based assessments. These will include bone density scanning (DXA and pQCT), muscle function testing and questionnaires re bone health, and biochemistry. The student will undertake analysis of baseline data, including more detailed analysis of pQCT scans using finite element modeling. This project encompasses many of the key skills of clinical research, and will provide a solid grounding for future clinical projects.

Primary Supervisor: Dr Peter Simm

Primary Supervisor Contact: peter.simm@mcri.edu.au

Project Site: Dept of Endocrinology -Royal Childrens Hospital

Honours places available: 1

Master of BioMed places available: 1

Elucidating molecular signalling pathways controlled by anti-inflammatory steroids

Project Description:

Steroids (glucocorticoids) are widely used to treat the chronic inflammation and pain associated with many diseases such as rheumatoid arthritis and osteoarthritis. Unfortunately, there are side effects associated with usage of glucocorticoids in such diseases. Our previous genomic experiments have provided a number of exciting candidate genes that may be involved in inflammatory functions. In this project you will investigate molecular signalling pathways that lead to activation of transcription factors that lead to differential expression of glucocorticoid-controlled genes in inflammatory conditions. Enhancing our understanding of molecular signalling pathways that are governed by glucocorticoids may lead to improved clinical therapies with minimal side effects.

Primary Supervisor: A/Prof Adrian Achuthan
Department of Medicine – Royal Melbourne Hospital

Molecular signalling pathways controlling gene expression during chronic disease progression

Project Description:

Inflammation is now known to be associated with many chronic diseases such as arthritis, cancer, Alzheimer’s disease, obesity, diabetes and heart diseases. This project aims to understand molecular signalling pathways controlling the expression of genes critical for the progression of such diseases. In this project you will explore in molecular terms how a particular inflammatory cell type (macrophage/dendritic cell) can adapt to provide a pro-inflammatory environment with consequences for persistence or otherwise of these significant diseases. More specifically you will investigate how transcription factors control the expression of pro-inflammatory and anti-inflammatory cytokines. Elucidation of these molecular pathways will lead to the development of novel therapies.

Primary Supervisor: A/Prof Adrian Achuthan

Primary Supervisor Contact: aaa@unimelb.edu.au

Project Site: Department of Medicine, Royal Melbourne Hospital

Honours places available: 1

Master of BioMed places available: 1

Roles of mammary adipose macrophages in breast cancer

Project Description:

Mammary adipose forms the large fraction of breast tumour microenvironment (TME). Macrophages, in particular tumour associated macrophages, are known to promote immune suppression to promote cancer growth. In the last decade, immune checkpoint inhibitors have revolutionised cancer therapy. However, this approach has had only limited success in breast cancers. While immune checkpoint inhibitors boost anti-tumour immune cells, immune suppression in TME could dampen this process. In this project, you will explore the role of mammary adipose macrophages and their response to immune checkpoint inhibitors.

Primary Supervisor: A/Prof Adrian Achuthan

Primary Supervisor Contact: aaa@unimelb.edu.au

Project Site: Department of Medicine, Royal Melbourne Hospital

Honours places available: 0

Master of BioMed places available: 1
The role of Critical Signalling Pathways in Glioblastoma Mediated Immunosuppression

Project Description:

The most severe form of brain cancer, Glioblastoma Multiforme is extremely lethal, with the average survival time of less than 12 months after diagnosis. Glioblastoma cells are generally highly proliferative, invasive. Recent evidence suggests that their micro-environment contains factors that suppress anti-tumour immune responses. However, the role of glioblastoma cell signalling in promoting an immunosuppressive environment is not well known. This project will evaluate the role of critical glioblastoma-promoting signalling pathways in promoting immunosuppression. Specifically, we will identify key immunosuppressive factors/cytokines secreted by glioblastoma cells and evaluate their role in blocking immune cell function (activation and killing activity).

Primary Supervisor: A/Prof Adrian Achuthan
Primary Supervisor Contact: aaa@unimelb.edu.au
Project Site: Department of Medicine, Royal Melbourne Hospital
Honours places available: 0
Master of BioMed places available: 1

Mortality and Morbidity due to thunderstorm asthma

Project Description:

Thunderstorm asthma is a global phenomenon with Melbourne Australia having the most frequent reports and severe episodes. The episode on 21st November 2016 was the most severe ever recorded and included 10 asthma fatalities. We have (following ethics approval and informed consent from families) obtained samples from 9 of those who died on that night and a databank of 228 individuals: the TAINSAR consortium. This project is to further explore this phenomenon.

Primary Supervisor: Prof Jo Douglass
Primary Supervisor Contact: jdouglass@unimelb.edu.au
Project Site: Department of Medicine, Royal Melbourne Hospital
Honours places available: 1
Master of BioMed places available: 1

Stentrode: Tissue Response to Endovascular Stimulation

Project Description:

Tissue response influences the effectiveness of the bioelectric implants. The aim of this project is to evaluate the Acute and chronic histological, macroscopic changes due to endovascular electrical stimulation to the surrounding blood vessels.

Primary Supervisor: Dr Sam John
Primary Supervisor Contact: sam.john@unimelb.edu.au
Effects of anticholinergic medications in hospitalised older patients discharged from geriatric rehabilitation wards

Project Description:

The aims of this longitudinal, prospective study are to detect anticholinergic medication use in older people across transitions of hospital care, to identify risk factors associated with anticholinergic medication use and to determine the associations of anticholinergic medication use with increased risk of clinical outcomes including mortality and re-admission to hospital. Trajectories will be examined at two weeks prior to admission to hospital, during transfer from an acute ward to a geriatric rehabilitation ward, on discharge from a geriatric rehabilitation ward and at three months post discharge. To conduct this study, the student will utilise the Comprehensive Geriatric Assessment – Geriatric Evaluation and Management (CGA-GEM) database and the Anticholinergic Risk Scale.

Primary Supervisor: Prof Elizabeth Manias

Primary Supervisor Contact: emanias@unimelb.edu.au

Project Site: Department of Medicine, Royal Melbourne Hospital

Honours places available: 1

Master of BioMed places available: 0

Effects of inappropriate medication use in frail older patients discharged from geriatric rehabilitation wards

Project Description:

The aims of this longitudinal, prospective study are to examine potentially inappropriate medication use in older, frail people across transitions of hospital care, to identify risk factors associated with inappropriate medication use and to determine the associations of potentially inappropriate medication use with increased risk of clinical outcomes including mortality and re-admission to hospital. Trajectories will be examined at two weeks prior to admission to hospital, during transfer from an acute ward to a geriatric rehabilitation ward, on discharge from a geriatric rehabilitation ward and at three months post discharge. To conduct this study, the student will utilise the Comprehensive Geriatric Assessment – Geriatric Evaluation and Management (CGA-GEM) database and the STOPPFrail (Screening Tool of Older Persons Prescriptions in Frail adults with limited life expectancy).

Primary Supervisor: Prof Elizabeth Manias

Primary Supervisor Contact: emanias@unimelb.edu.au

Project Site: Department of Medicine, Royal Melbourne Hospital
Honours places available: 1
Master of BioMed places available: 1

**Manipulating Recipient Immunological Microenvironment to Improve Outcomes in Allogeneic Transplantation**

**Project Description:**

Allogeneic stem cell transplant (alloSCT) cures blood cancers by establishing a new immune system from the donor. Currently, AlloSCT has significant side effects including graft versus host disease (GVHD) and toxicity from strong chemotherapy. We will use new types of drugs to more safely modify recipient’s immunity prior to transplantation and examine how modifications in immunity allows for successful engraftment, freedom from toxicity (including GVHD) and improve anti-cancer responses.

**Primary Supervisor:** Prof David Ritchie

**Primary Supervisor Contact:** david.ritchie@mh.org.au

**Project Site:** Department of Medicine, Royal Melbourne Hospital

Honours places available: 1
Master of BioMed places available: 1

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**Recipient immunity as a determinant of long term outcome in bone marrow transplantation**

**Project Description:**

Allogeneic bone marrow transplantation (alloSCT) is a curative therapy for blood cancers. However, up to 50% of patients undergoing alloSCT continue to face the prospect of disease relapse, regimen-related toxicity, opportunistic infections and graft versus host disease. We have shown in mouse models that residual recipient immunity present at the time of alloSCT has a significant impact on outcome. We have launched multiple clinical trials to translate this finding to the clinic which incorporate significant correlative immunology analysis and will form the basis of this project.

**Primary Supervisor:** Prof David Ritchie

**Primary Supervisor Contact:** david.ritchie@mh.org.au

**Project Site:** Department of Medicine, Royal Melbourne Hospital

Honours places available: 1
Master of BioMed places available: 1

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**T cell function as a determinant of blinatumomab efficacy in B-ALL**

**Project Description:**

The CD3/CD19 bispecific T cell engager blinatumomab (blin) is effective for the treatment of relapsed or refractory B cell acute lymphoblastic leukaemia (B-ALL). Total CD8 T cell numbers at the time of treatment have been associated with a higher likelihood of response. However, studies have
not explored if patient T cell function has an impact on therapeutic efficacy. We hypothesise that response to blin will be dependent on pre-treatment T cell function.

**Primary Supervisor:** Prof David Ritchie  
**Primary Supervisor Contact:** david.ritchie@mh.org.au  
**Project Site:** Department of Medicine, Royal Melbourne Hospital  
**Honours places available:** 1  
**Master of BioMed places available:** 1

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**Understanding how immune cell function is impacted by novel therapies in patients with B cell malignancies**

**Project Description:**

In recent years, new non-chemotherapy based small molecule inhibitors such as Venetoclax and Ibrutinib have been shown to offer improved outcomes in patients with B cell malignancies. Our existing data has demonstrated that these therapies have a significant impact on patient immune function when used long term which will be explored further in this project.

**Primary Supervisor:** Prof David Ritchie  
**Primary Supervisor Contact:** david.ritchie@mh.org.au  
**Project Site:** Department of Medicine, Royal Melbourne Hospital  
**Honours places available:** 1  
**Master of BioMed places available:** 1

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**Population frequencies of common genetic diseases**

**Project Description:**

The population frequencies of many genetic diseases has been unknown but now using normal population frequency databases we are able more accurately identify how common these diseases are. This project will look at some of the common genetic diseases and analyse variants for pathogenicity using on line tools. We expect our students to be able to publish their results.

**Primary Supervisor:** Prof Judy Savige  
**Primary Supervisor Contact:** j.savige@unimelb.edu.au  
**Project Site:** Department of Medicine, Royal Melbourne Hospital  
**Honours places available:** 0  
**Master of BioMed places available:** 2

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**Systematic Endoscopic Staging of Mediastinum to determine Impact on radiotherapy for locally advanced lung Cancer (SEISMIC): an international multi-centre cohort study**
Project Description:

Lung Cancer remains the most common cause of cancer death in Australia & the western world. Non-small cell lung cancer (NSCLC) comprises 87% of all lung cancers, and of these over 25% are diagnosed with locally advanced disease – defined by involvement of mediastinal lymph nodes (LN). The SEISMIC study aims to identify the optimal method for mediastinal LN and planning of radiation therapy fields.

Primary Supervisor: A/Prof Daniel Steinfort

Primary Supervisor Contact: Daniel.Steinfort@mh.org.au

Project Site: Department of Medicine, Royal Melbourne Hospital

Honours places available: 1

Master of BioMed places available: 1

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Thunderstorm Asthma In Seasonal Allergic Rhinitis (TAISAR) Study – springtime symptoms and local environmental conditions

Project Description:

Epidemic thunderstorm asthma has had catastrophic effects on individuals, emergency services and health systems. In order to better understand the risk factors associated with people who develop thunderstorm asthma, we need to know more about their characteristics and how these may be associated with their symptoms. The TAISAR cohort is comprised of 228 individuals who had self-reported a past diagnosis of thunderstorm asthma and/or self-reported experiencing seasonal allergic rhinitis (hayfever). These participants provided a range of clinical data including tests (skin prick tests and rye-grass pollen specific IgE) for their allergic sensitisation to a range of common allergens. These individuals were also able to report their symptoms during two springtime periods over two years in real-time via a smartphone application which also tracked local air quality conditions. For this study we propose that an Honours Candidate undertakes an analysis of the TAISAR dataset to: (1) Describe the symptoms reported by the TAISAR cohort during springtime in Melbourne over two years. (2) Analyse the relationships between these symptoms and local environmental conditions. (3) Analyse the relationship between these symptoms and the risk of having experienced thunderstorm asthma.

Primary Supervisor: Dr Rachel Tham

Primary Supervisor Contact: rachel.tham@unimelb.edu.au

Project Site: Department of Medicine, Royal Melbourne Hospital

Honours places available: 1

Master of BioMed places available: 1

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Decoding visual input in semantic space

Project Description:
Brain computer Interfaces offer hope of rehabilitation for people with paralysis. However, one major drawback of the state of the art BCIs are that they are slow. Recent work has shown the feasibility semantic space decoding to visual stimuli. Using deep learning such as the natural language processing model, we can create a decoder that can generalize natural scenes within novel visual stimuli. Using data obtained from electrocorticography and the stentrode in an pre-clinical model we can develop a practical brain-machine interface with the ability to decode thought directly. In this project we aim to decode vector representations of scenes within the semantic space to assess data from a stentrode can be used to decode semantic representations of visual space.

**Primary Supervisor:** Dr Sam John  
**Primary Supervisor Contact:** sam.john@unimelb.edu.au  
**Project Site:** Department of Medicine, Royal Melbourne Hospital  
**Honours places available:** 1  
**Master of BioMed places available:** 0

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**Let's CHAT dementia project: optimising detection and management of cognitive impairment and dementia in Aboriginal and Torres Strait Islander People attending primary care**  
**Project Description:**  
The risk of developing dementia is 3-4 times higher in First Nations Peoples of Australia. The Let’s CHAT dementia project is a Stepped wedge RCT that has collaborated with 12 Aboriginal health services nationwide, to address ways to optimise brain health and improve management of those with dementia. As part of the 4 year project, information has been collected through 6 monthly audits (approx. 1100) and comprehensive assessment in approximately 80-100 participants. This project involves exploring the data base for the quantitative and qualitative factors that contribute to a model of care that optimises detection and management of cognitive impairment and dementia in Aboriginal Primary Health Care Services. We encourage Aboriginal and Torres Strait Islander students to apply.  
**Primary Supervisor:** A/Prof Dina LoGiudice  
**Primary Supervisor Contact:** dina.logiudice@mh.org.au  
**Project Site:** Department of Medicine, Royal Melbourne Hospital  
**Honours places available:** 1  
**Master of BioMed places available:** 1

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**Department of Medicine, Royal Melbourne Hospital - Peter Doherty Institute for Infection and Immunity**  
**Development of malaria transmission blocking drugs.**  
**Project Description:**
Our laboratory investigates the cellular mechanisms underpinning malaria parasite transmission and disease. We investigate the novel banana shaped sexual stages of Plasmodium falciparum, focused on understanding their unique biology and how this contributes to transmission. We are interested in developing and testing drugs and vaccines that may block transmission of the parasite from infected humans to Anopheles mosquitoes.

**Primary Supervisor:** Dr Matthew Dixon

**Primary Supervisor Contact:** dixon.m@wehi.edu.au

**Project Site:** Department of Medicine, Royal Melbourne Hospital - Peter Doherty Institute for Infection and Immunity

**Honours places available:** 1

**Master of BioMed places available:** 1

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**Malaria: going bananas for sex**

**Project Description:**

The malaria parasite Plasmodium falciparum undergoes a remarkable transformation that allows asexual stage multiplication in a human host and sexual reproduction in a mosquito vector. Gametocyte maturation represents a ‘bottle neck’ in the parasite’s development; inhibition of this process would ablate disease transmission. This transformation sees an amoeboid shaped asexual stage parasite morph into a banana shaped sexual stage parasite, which is essential to disease transmission.

Despite the importance of this stage of the parasite we understand very little about its unique biology. This unique shape is driven by the assembly of a membrane complex termed the inner membrane complex and the elaboration of a dense microtubule cytoskeleton that drives the unique gametocyte shape. In this project we are interested in determining the cellular and molecular players driving this shape change and how this influences survival within the host and mosquito transmission.

**Primary Supervisor:** Dr Matthew Dixon

**Primary Supervisor Contact:** dixon.m@wehi.edu.au

**Project Site:** Department of Medicine, Royal Melbourne Hospital - Peter Doherty Institute for Infection and Immunity

**Honours places available:** 1

**Master of BioMed places available:** 1

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**Department of Medicine, Royal Melbourne Hospital- Austin Health Heidelberg**

**Genetic Diagnosis of Children with Vascular Anomalies for a Therapeutic Clinical Drug Trial**

**Project Description:**
Our understanding of the genetics of vascular anomalies is rapidly advancing but remains incompletely understood. An inherited germline mutation may lead to a predisposition to developing vascular anomalies, with a ‘second hit’ somatic mutation occurring within the affected tissues. In other sporadic cases a somatic variant alone arising in the affected tissue at low frequency during early development may be sufficient to cause the vascular anomaly. The Vascular Anomaly Clinic at RCH has a large cohort of patients with a wide variety of vascular anomalies, including those associated with overgrowth syndromes. Most of these patients are sequencing naïve.

Analysis of DNA from blood may not identify a mutation in individuals with vascular anomalies, however sequencing tissue extracted from surgical specimens may identify the causative variant. Technologies such as high-depth sequencing or droplet digital PCR are key in detecting and quantifying mosaic variants in various tissues. Patients in whom appropriate variants are identified will be eligible for enrolment in our new 5-year MRFF-funded Rare Cancers Rare Diseases Unmet Needs (RCRDUN) Clinical Trial of targeted therapies for vascular anomalies commencing in 2022.

**Aims:**

1. To perform high depth gene panel or exome sequencing, or sensitive droplet digital PCR, to detect germline or somatic variants in individuals from large families with multiple affected individuals, sporadic cases, or those with atypical clinical presentations, in order to identify causative mutations in known and novel genes.

2. To gain hands-on experience with current genomic technologies and understand appropriate application, strengths and limitations of these technologies.

3. To understand the pathway from the clinic, through the laboratory process, to molecular diagnosis and back to the bedside, culminating in clinical trial of targeted drug therapies for patients with severe disease intractable to standard care.

**Methodology:**

1. Recruitment of families with multiple affected individuals (estimate ~15 families) and sporadic cases without family history (estimate ~30 individuals)

2. Application of current genomic testing technologies to these families and individuals using paired DNA samples extracted from lymphocytes and from surgical tissue to identify causative mutations.

This project provides the opportunity to work in an established multidisciplinary clinical and laboratory research team with clinical trial expertise. In addition to clinical experience and laboratory techniques, the development of project management, sample coordination and communication skills will be fostered.

**Primary Supervisor:** A/Prof Michael Hildebrand

**Primary Supervisor Contact:** michael.hildebrand@unimelb.edu.au

**Project Site:** Department of Medicine, Royal Melbourne Hospital- Austin Health Heidelberg

**Honours places available:** 1

**Master of BioMed places available:** 1
Department of Obstetrics and Gynaecology

The mechanism of action of metformin to treat preeclampsia

Project Description:

Preeclampsia is a serious complication of pregnancy with no medical treatment. We have shown metformin quenches the disease process in tissues and have promising clinical data. In this project we will explore its mechanism of action likely through altering mitochondrial dynamics.

Primary Supervisor: Dr Fiona Brownfoot
Primary Supervisor Contact: fiona.brownfoot@gmail.com
Project Site: Dept of Obstetrics and Gynaecology - RWH
Honours places available: 1
Master of BioMed places available: 1

Inflammatory mediators in the development of preeclampsia and pre-term birth.

Project Description:

Preeclampsia, pre-term birth and still birth are severe conditions affecting 10-15% of pregnancies worldwide. There are no treatments. This project will identify how these diseases develop and may lead to the development of new therapeutic targets.

Primary Supervisor: Prof Eva Dimitriadis
Primary Supervisor Contact: eva.dimitriadis@unimelb.edu.au
Project Site: Dept of Obstetrics and Gynaecology - RWH/Mercy
Honours places available: 1
Master of BioMed places available: 1

Testing for biomarkers and therapeutics for female infertility

Project Description:

This project aims to recreate human organoid cultures of the endometrium to determine the cause and treatment of embryo implantation failure infertility.

Primary Supervisor: Prof Eva Dimitriadis
Primary Supervisor Contact: eva.dimitriadis@unimelb.edu.au
Project Site: Dept of Obstetrics and Gynaecology - RWH/Mercy
Honours places available: 1
Master of BioMed places available: 1
Innovative methods for the early detection and surveillance of endometriosis

Project Description:
This project will involve systematically reviewing and understating the current knowledge base of disease diagnosis and surveillance using imaging platforms (for example, positron emission tomography [PET] or angiography) and / or routine clinical assessments (comprehensive metabolic blood panel, blood pressure, BMI) commonly used outside of the gynaecology discipline to determine applicability in the setting of endometriosis. Systemic reviews, qualitative studies and data linkage studies may be incorporated into the project. The project will include protocol design, pilot studies and building collaborative networks with diverse disciplinary teams.

Primary Supervisor: Dr Sarah Holdsworth-Carson

Project Site: Dept of Obstetrics and Gynaecology - RWH/Mercy

Honours places available: 1

Master of BioMed places available: 1

Fertility preservation in children with cancer

Project Description:
One in 900 children is a cancer survivor. Cancer treatment can significantly affect future fertility. Determining an accurate risk assessment helps in counseling families considering fertility preservation procedures. We have one of the largest registries of paediatric cancer patients, from which we can research risk factors, counseling and effectiveness of procedures.

Primary Supervisor: A/Prof Yasmin Jayasinghe

Project Site: Dept of Obstetrics and Gynaecology - RWH/Mercy

Honours places available: 1

Master of BioMed places available: 1

Development of clinician-led digital tools to improve diagnosis and treatment in paediatric adolescent and young adult oncofertility patients throughout the ANZCO Clinical Trials Network

Project Description:
The consortium of paediatric oncofertility centres in Australia and NZ (ANZCO) through a recent MRFF grant will be developing and implementing new clinical guidelines as well as new digital tools to help improve clinical care for paediatric cancer patients.

Primary Supervisor: A/Prof Yasmin Jayasinghe

Primary Supervisor Contact: yasmin.jayasinghe@unimelb.edu.au
**Project Site:** Dept of Obstetrics and Gynaecology - RWH/Mercy

**Honours places available:** 1

**Master of BioMed places available:** 1

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**Point of care testing for the diagnosis of gestational diabetes**

**Project Description:**

Gestational diabetes is a form of diabetes that arises in pregnancy due to hormonal changes associated with the placenta and the fetus. The Glucose Tolerance Test (GTT) is recommended in all pregnancies to screen for gestational diabetes. However, this test is sub-optimal. Prolonged delays between sample collection and processing can result in a less accurate GTT result. This particularly affects pregnant women who live in rural or remote Australia, and may impact the healthcare of mother and baby during pregnancy. This project aims to explore the role of point of care glucose testing in the diagnosis of gestational diabetes.

**Primary Supervisor:** Dr Sarah Price

**Primary Supervisor Contact:** Sarah.price@unimelb.edu.au

**Project Site:** Dept of Obstetrics and Gynaecology - RWH/Mercy

**Honours places available:** 1

**Master of BioMed places available:** 1

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**Vitrification of animal prepubertal testicular tissue**

**Project Description:**

This project will compare the slow freezing procedure currently used for human prepubertal testicular tissue with rapid freezing, referred to as vitrification. The aim is to assess temperature, media composition, rate of cooling and warming on animal prepubertal testicular tissue. Multiple cells are required for spermatogonial stem cells to progress through to formation of mature sperm, the impact of these variables in the freezing of each cell type will be assessed.

**Primary Supervisor:** Dr Yasmin Jayasinghe

**Primary Supervisor Contact:** yasmin.jayasinghe@unimelb.edu.au

**Project Site:** Dept of Obstetrics and Gynaecology - RWH/Mercy

**Honours places available:** 1

**Master of BioMed places available:** 1

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**Elimination of leukemic cells from ovarian tissue**

**Project Description:**

Ovarian tissue frozen to preserve fertility from women and girls with leukaemia has the potential to harbour leukemic cells, and if grafted back could re-initiate disease. The overall project aim is to
produce an artificial ovary reconstructed from ovarian follicles and stromal cells free from leukemic contamination. The aim of this part of the project is to isolate ovarian follicles, seed these within a 3-dimensional matrix and determine factors which are required for these to grow these in vitro.

**Primary Supervisor:** Dr Yasmin Jayasinghe

**Primary Supervisor Contact:** yasmin.jayasinghe@unimelb.edu.au

**Project Site:** Dept of Obstetrics and Gynaecology - RWH/Mercy

**Honours places available:** 1

**Master of BioMed places available:** 1

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Use of a respiratory function monitor to improve training efficiency in neonatal face mask ventilation: A feasibility trial

**Project Description:**

At birth, newborn infants undergo a complex physiological transition. Respiratory changes include lung aeration, airway liquid clearance, and the initiation of pulmonary gas exchange. Approximately 5% of term newborns need respiratory support to successfully complete this transition, therefore providing rapid and effective positive pressure ventilation (PPV) via a face mask is considered to be the most important component of neonatal resuscitation. Face-mask ventilation is an essential skill taught in neonatal resuscitation training, but competence is difficult to achieve and maintain. Respiratory Function Monitors (RFMs) are used to determine the effectiveness of newborn ventilation. RFMs may help clinicians improve resuscitation performance by providing feedback on face-mask leak and delivered tidal volume. We hypothesise that using a respiratory function monitor during self-directed face-mask ventilation training, compared with training without using the RFM, will improve effectiveness of resuscitation by reducing mask leak. The aim of this study is to compare the leak and tidal volume during face-mask ventilation training, performed by first responders after monthly RFM-assisted self-directed face-mask ventilation training, to first responders training without a RFM, and to assess the feasibility of such a training program.

**Primary Supervisor:** A/Prof Marta Thio

**Primary Supervisor Contact:** marta.thiolluch@thewomens.org.au, please direct enquiries to co-supervisor Elizabeth Baker elizabeth.baker2@thewomens.org.au

**Project Site:** Dept of Obstetrics and Gynaecology - RWH/Mercy

**Honours places available:** 1

**Master of BioMed places available:** 0

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Dept of Obstetrics and Gynaecology - RWH/Royal Children's Hospital

Fertility preservation in children with cancer

**Project Description:**
One in 900 children is a cancer survivor. Cancer treatment can significantly affect future fertility. Determining an accurate risk assessment helps in counseling families considering fertility preservation procedures. We have one of the largest registries of paediatric cancer patients, from which we can research risk factors, counseling and effectiveness of procedures.

**Primary Supervisor:** A/Prof Yasmin Jayasinghe

**Primary Supervisor Contact:** yasmin.jayasinghe@unimelb.edu.au

**Project Site:** Dept of Obstetrics and Gynaecology - RWH/Royal Children's Hospital

**Honours places available:** 1

**Master of BioMed places available:** 1

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**Department of Psychiatry**

**Sleep and neurodevelopment in adolescence**

**Project Description:**

Healthy sleep is critical for good health, including brain health. This program of research will examine the impact of developmental changes in sleep and circadian factors on the development of brain structure and function over adolescence. Secondary aims will examine whether changes in these relationships increase the risk for the later development of psychopathology, and/or factors (e.g. SES, parental behaviours) that might influence sleep outcomes as well as sleep-brain associations. Students will carve a specific project relevant to the larger program and in accordance with their interests.

**Primary Supervisor:** Dr Vanessa Cropley

**Primary Supervisor Contact:** vcropley@unimelb.edu.au

**Project Site:** Dept of Psychiatry - Royal Melbourne Hospital

**Honours places available:** 0

**Master of BioMed places available:** 1

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**Synthesising, dismantling and optimising cognitive interventions**

**Project Description:**

Our group is a world leader in research synthesis of cognitive interventions across the lifespan and brain disorders. Using large datasets from hundreds of clinical trials, we use cutting-edge meta-analysis techniques to identify the active ingredients and core components of interventions, and define the most effective intervention and treatment strategies for different populations of individuals. We produce robust evidence and high-impact publications that that have influenced changes in both policy and clinical practice. Our group offers a range of projects (Honours to PhD), with a particular interest in ageing (older adult populations), neurodegenerative disorders (e.g., multiple sclerosis), psychiatric disorders (e.g., depression) and cancer.
Markers in Neuropsychiatric Disorders (MiND) study

Project Description:

The Markers in Neuropsychiatric Disorders (MiND) aims to study whether neurofilament light and other biomarkers, clinical, cognitive, imaging and other markers can improve diagnosis, prognostication, care and treatment, and health economic outcomes, for people with cognitive, neuropsychiatric and neurological symptoms. By studying a broad range of symptoms and conditions, from neurodegenerative dementias such as Alzheimer disease and behavioural variant frontotemporal dementia, to many other neurological and neurodegenerative disorders, to schizophrenia and other severe psychiatric illnesses, the MiND study ultimately aims for clinical translation such as a screening blood test and precision care use of biomarkers and other markers, to improve outcomes for patients, their families, clinical trials and healthcare systems.

Primary Supervisor: Prof Dennis Velakoulis

Primary Supervisor Contact: dennisv@unimelb.edu.au

Project Site: Dept of Psychiatry - Royal Melbourne Hospital

Honours places available: 1

Master of BioMed places available: 1

The impact of early life stress on neurodevelopmental trajectories across different mental health diagnoses in children

Project Description:

Over the past several decades there has been a growing understanding that exposure to early life stress is also associated with adverse mental health outcomes. However, while it is clear that psychosocial stress is a risk factor for many mental health disorders, it is less clear whether particular types of stressors are more strongly associated with particular diagnoses, or whether these stressors represent a general, non-specific, risk factor for poorer health outcomes. Furthermore, the impact of early life stress on brain and cognitive development across mental health diagnoses is currently unclear. The broad aims of this research are therefore to (1) identify early life stressors that ‘hang together’ in a large longitudinal sample of children and adolescents, (2) determine the prevalence of these stressors across neurodevelopmental and psychiatric disorder diagnoses, (3) examine the impact of different stressors on brain development trajectories across diagnoses, and (4) examine the impact of different stressors on cognitive trajectories across diagnoses. Students will focus on select aims depending on their degree (honours, Masters, PhD). This study will utilise data from the ABCD Study, a large multi-site longitudinal study of more than 11,000 children.
Brain mapping: Brain atlases with multiple topographic features

Project Description:
Map innovative atlases of the human brain that incorporate multiple topographic features

Primary Supervisor: A/Prof Andrew Zalesky
Primary Supervisor Contact: azalesky@unimelb.edu.au
Project Site: Dept of Psychiatry - Royal Melbourne Hospital
Honours places available: 1
Master of BioMed places available: 1

Brain stimulation and clinical translation

Project Description:
Develop innovative brain stimulation therapies for depression and other psychiatric disorders based on new knowledge of aberrant brain circuits and systems

Primary Supervisor: A/Prof Andrew Zalesky
Primary Supervisor Contact: azalesky@unimelb.edu.au
Project Site: Dept of Psychiatry - Royal Melbourne Hospital
Honours places available: 1
Master of BioMed places available: 1

Computational neuroscience: Simulating brain dynamics and generative modelling of brain networks

Project Description:
Simulate a person's brain activity based on their connectome and develop models to grow brain networks in silico

Primary Supervisor: A/Prof Andrew Zalesky
Primary Supervisor Contact: azalesky@unimelb.edu.au
Project Site: Dept of Psychiatry - Royal Melbourne Hospital
Honours places available: 1
Master of BioMed places available: 1

Machine learning prediction of brain and body ageing

Project Description:
Your brain and other organs may be older (or younger) than your chronological age! Why?

Primary Supervisor: A/Prof Andrew Zalesky
Primary Supervisor Contact: azalesky@unimelb.edu.au
Project Site: Dept of Psychiatry - Royal Melbourne Hospital
Honours places available: 1
Master of BioMed places available: 1

Network communication in the brain

Project Description:
Use network science to understand how information is communicated in nervous systems

Primary Supervisor: A/Prof Andrew Zalesky
Primary Supervisor Contact: azalesky@unimelb.edu.au
Project Site: Dept of Psychiatry - Royal Melbourne Hospital
Honours places available: 1
Master of BioMed places available: 1

Dept of Radiology - Royal Melbourne Hospital

Quantitative imaging in dementia

Project Description:
The aim of this study is to explore the utility of advanced MR imaging approaches in detecting early dementia.

Primary Supervisor: Prof Patricia Desmond
Primary Supervisor Contact: Patricia.Desmond@mh.org.au
Project Site: Dept of Radiology - Royal Melbourne Hospital
Honours places available: 1
Master of BioMed places available: 1
Improve the diagnostic prediction of imaging measures in dementia and epilepsy

Project Description:

The aim of this study is to study the impact of neuroimaging tools driven by machine learning on clinical diagnosis in dementia and epilepsy.

Primary Supervisor: Dr Vijay Venkatraman

Primary Supervisor Contact: vijay.venkatraman@unimelb.edu.au

Project Site: Dept of Radiology - Royal Melbourne Hospital

Honours places available: 1

Master of BioMed places available: 1

Multimodal imaging measures to improve dementia diagnosis

Project Description:

The aim of this study is to study the influence morphological and longitudinal measures to improve dementia diagnosis.

Primary Supervisor: Dr Vijay Venkatraman

Primary Supervisor Contact: vijay.venkatraman@unimelb.edu.au

Project Site: Dept of Radiology - Royal Melbourne Hospital

Honours places available: 1

Master of BioMed places available: 1

Stroke assessment with multi-modal imaging

Project Description:

The aim of this project will be to explore the utility of multimodal imaging in stroke assessment.

Primary Supervisor: Dr Vijay Venkatraman

Primary Supervisor Contact: vijay.venkatraman@unimelb.edu.au

Project Site: Dept of Radiology - Royal Melbourne Hospital

Honours places available: 1

Master of BioMed places available: 1

Dept of Surgery - Royal Melbourne Hospital

Investigating the link between phenotype change and treatment resistance in prostate cancer
Project Description:

The development of resistance to androgen (male sex hormone) deprivation therapy (ADT), the primary treatment for aggressive prostate cancer, is not clearly understood. Our phylogenetic analyses of resistant tumours demonstrate no significant tumour evolution or clonal/subclonal selection with therapy, supporting the concept that resistant tumours are "hardwired" to survive in the castrate environment. We have previously found no mutation or structural variant consistently shared between resistant tumours at any of the gene/pathway/ontology levels, and no evidence of previously characterised genomic drivers of resistance. We have performed whole genome and RNA sequencing on paired pre- and post-treatment tumour samples obtained from high-risk patients undergoing profound androgen suppression for 6 months before prostatectomy, in whom clinical responses ranged from complete involution to no effect. Transcriptional profiling indicated that resistant cells undergo a phenotypic reprogramming in response to therapy that may be important for cellular survival, and suggests that these changes are regulated by alterations in post-translational histone modifications. This raises the possibility that hardwired resistance is epigenetically, and not genomically mediated. Our data from patient-derived tumours grown in androgen-deprived conditions support the concept that cancer cells adapt to castration though histone mediated transcriptional reprogramming and development of a stem cell–like phenotype. This project will involve establishing an organoid model of prostate cancer and investigating the effect of perturbing key nodes in this adaptive process.

Primary Supervisor: A/Prof Niall Corcoran

Primary Supervisor Contact: con@unimelb.edu.au

Project Site: Dept of Surgery - Royal Melbourne Hospital

Honours places available: 1

Master of BioMed places available: 1

The role of invadopodia in glioblastoma invasion and response to therapeutics

Project Description:

This project will involve studies that investigate the role of invadopodia in glioblastoma cells, how they contribute to the invasive phenotype of this deadly brain cancer and also exploring the use of repurposed FDA approved drugs to inhibit their ability in facilitating glioblastoma cell invasion throughout the surrounding normal brain.

Primary Supervisor: Dr Stanley Stylli

Primary Supervisor Contact: sstylli@unimelb.edu.au

Project Site: Dept of Surgery - Royal Melbourne Hospital

Honours places available: 0

Master of BioMed places available: 1

Florey Department of Neuroscience and Mental Health
Biophysics of leaky HCN ion channels

Project Description:

The hyperpolarisation-activated, cyclic nucleotide-gated (HCN) channel, opens and conducts positively charged ions when the transmembrane voltage is negative on the inside. Several variants in the HCN1 subtype channel have been reported in patients with severe epilepsy. Functional analyses of these variants revealed a converging functional impact of ‘leaky’ channels, which remain open and conduct ions at membrane voltages in which the channels are meant to be closed. Our goal is to elucidate HCN1 channel function at the molecular scale using naturally occurring variants as novel functional tools. Successful applicants will have the opportunity to learn and operate two-electrode voltage clamp, voltage clamp fluorometry (which measures channel movement in real-time), electrophysiological analysis, Xenopus oocyte handling/injections, molecular biology, and be involved in manuscript preparation.

Primary Supervisor: Prof Christopher Reid

Primary Supervisor Contact: christopher.reid@unimelb.edu.au

Project Site: Florey Department of Neuroscience and Mental Health

Honours places available: 1

Master of BioMed places available: 1

Using novel animal and stem cell models to investigate the role of genetic cardiac arrhythmia in sudden unexpected death in epilepsy (SUDEP).

Project Description:

We recently provided evidence that epilepsy patients carrying loss-of-function variants in a cardiac arrhythmia gene are at greater risk of sudden death, known as SUDEP. This project aims to understand how genetic cardiac arrhythmia contribute to SUDEP risk by using EEG-ECG to monitor the changes in brain and heart function during seizures and sudden deaths in novel SUDEP mouse models. Furthermore, the project aims to develop and measure electrophysiology of stem cell-derived cardiomyocytes, including 3D “mini heart” cardiac organoids, that express the cardiac arrhythmia variant identified in SUDEP patients. These models provide an opportunity to test cardio-protective strategies on SUDEP risk. Successful applicants will have the opportunity to learn to operate multi-electrode array system, optogenetics, patch-clamp electrophysiology, perform EEG-ECG surgery/monitoring/analysis, mouse handling/injections, stem cell culture, molecular biology, and be involved in manuscript preparation.

Primary Supervisor: Prof Christopher Reid

Primary Supervisor Contact: christopher.reid@unimelb.edu.au

Project Site: Florey Department of Neuroscience and Mental Health

Honours places available: 1

Master of BioMed places available: 1

Investigating cardiac mechanisms underlying stimulant-mediated sudden death
Project Description:

This is an exciting pilot study that will record brain and heart electrophysiology using an optimised video-electrocorticography-electrocardiogram (vECoG-ECG) in a cardiac arrhythmia mouse model to study the additive impact of stimulants and genetic cardiac arrhythmia on sudden death risk. The mouse model also provides an opportunity to test cardio-protective strategies on sudden death risk. Successful applicants will have the opportunity to join a friendly team and perform ECoG-ECG surgery/recording/analysis, mouse handling/injections, behavioural studies and be involved in manuscript preparation.

Primary Supervisor: Dr Ming Soh

Primary Supervisor Contact: mingshiuan.soh@florey.edu.au

Project Site: Florey Department of Neuroscience and Mental Health

Honours places available: 1

Master of BioMed places available: 0

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Modelling severe childhood epilepsy using stem cell derived neuronal models

Project Description:

Epilepsy is a common neurological disorder with a third of patients not responding to currently available treatments. To better understand the underlying mechanisms, our lab is developing and analysing disease models for genetic forms of epilepsy.

Primary Supervisor: A/Prof Snezana Maljevic

Primary Supervisor Contact: snezana.maljevic@florey.edu.au

Project Site: Florey Institute of Neuroscience and Mental Health

Honours places available: 1

Master of BioMed places available: 1

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Targeting disrupted neural activity to treat cognitive and behavioral symptoms in preclinical models for schizophrenia and depression

Project Description:

Identifying the neural mechanisms that are disrupted and underlie cognitive and behavioral symptoms in mental disorders like schizophrenia and depression remains a challenge. Yet, this fundamental knowledge is key for driving the development of new treatments that address are more effective, have less side effects and address the current burden of treatment-resistance. The ability to measure and control behaviour in preclinical animal models, using sophisticated automated behavioural systems while recording real-time neural activity, provides advanced experimental approaches to tackle this challenge. Combining these approaches with new tools for pose estimation with deep learning now allows training of deep neural networks to accurately quantify a range of complex behavioural measures. This project will use mouse models that display disrupted cognitive behaviours, apply in vivo imaging approaches to identify changes in neural
Melbourne Neuropsychiatry Centre
Exploring the effects of dimensions of early life adversity on cognition and mental health in young adults

Project Description:
Dimensional models of early-life adversity (ELA) propose that there are core features of early-life environmental experiences that vary along a continuum of severity and in forms of adversity. Recent work has outlined three primary dimensions along which specific types of ELA may fall: threat/harshness, neglect/deprivation, and unpredictability. Although emerging evidence suggests that partially distinct mechanisms may underlie the association between these different dimensions of ELA with psychopathology and cognitive functioning in children and adolescents, the persistence of these associations into adulthood remain unclear. Further, few studies have studied the unique effects of threat/harshness, deprivation, and unpredictability simultaneously in relation to mental health and cognition.

The current project will examine the associations between experiences of threat, deprivation and unpredictability with cognition and mental health functioning in a sample of young adults. The student will use preliminary data from an on-going study that includes measures of early life experiences of adversity, cognitive functioning and self-report measures of psychopathology. The student will develop the project, conduct a literature review and perform statistical analyses.

Primary Supervisor: A/Prof Vanessa Cropley
Primary Supervisor Contact: vcropley@unimelb.edu.au
Project Site: Melbourne Neuropsychiatry Centre
Honours places available: 1
Master of BioMed places available: 1

Northern Health
Global coagulation assays and molecular spectroscopy as novel biomarkers for coagulation risk prediction

Project Description:
Blood coagulation remains one the most enigmatic of essential physiological processes and is a major determinant of health and disease. Pathological thrombosis is a major cause of death and morbidity across a wide spectrum of diseases and patients. While a plethora of anti-thrombotic...
drugs are now available, a fine balance needs to be achieved between the prevention of thrombosis in individuals and the risk of bleeding complications. Indeed, one also needs to define, accurately, people who are most risk and who may best benefit from such interventions.

Current risk assessment models and blood tests do not accurately predict individual risk of thrombosis. Risk estimation of thrombosis and bleeding, at an individual level is performed only crudely, and implies that a proportion of patients with thrombosis, are either over or undertreated, leading to high lifetime risks of both recurrence and bleeding. It is therefore necessary to individually classify patients, accurately, with respect to thrombotic and bleeding risk, and subsequently determine who will benefit from anticoagulant treatment and who will be unnecessarily exposed to its risks.

We therefore require a model which assesses the various determinants of the coagulation cascade, including the structural basis of the clot formation, the coagulability of blood and the cellular (endothelial, platelet, immune) dysfunctional components, that contribute to this process.

Global coagulation assays such as thrombin, fibrin and plasmin generation assays are blood tests with the unique capacity to assess the "whole blood clotting" capacity of an individual while endothelial biomarkers such as tissue factor pathway inhibitor and inflammatory markers can help to identify endothelial dysfunction. We have previously demonstrated that the addition of global coagulation assays and endothelial biomarkers to clinical surrogate markers are superior to clinical markers alone in identifying diabetes complications and subsequent thrombotic events in patients with chronic kidney disease. This paradigm extends to a variety of other diseases as well.

Molecular Spectroscopy (Raman Scattering and Infra-Red Absorption) is a sophisticated method of assessing individual molecular structure, and is particularly useful in the identification of complex molecules in complex biological tissues such as blood. The advantage of Molecular Spectroscopy is that the technique does not need any molecular labelling, and can be performed on clinical samples without destroying them. Raman and Fourier Transform InfraRed Spectroscopy (FTIR) provide a fingerprint of the molecular structure, leading to the discovery and identification of complex structural molecules and their conformational variants.

In this project we propose to perform global coagulation assays and endothelial biomarkers on healthy control populations and populations at high risk of coagulation such as those with cardiovascular disease or risk factors, previous venous thromboembolism and malignancies). We will also test the patients plasma using Raman and FTIR spectroscopy to identify and build a library of spectral signatures within each of the high risk patient categories and compare that with healthy controls. A Machine Learning approach shall be used to determine the principal components that determine variance, in each of these categories so as to define the threshold for accurate classification within each class.

In combination, the combination of global coagulation assays and endothelial biomarkers with spectral biomarker signatures will provide a multi-modality approach which may strengthen our ability to predict individualised future thrombotic risks and allow for early intervention with reduction in the burden of disease.

Primary Supervisor: Assoc Prof Prahlad Ho
**Primary Supervisor Contact:** prahlad.ho@nh.org.au  
**Project Site:** Northern Health  
**Honours places available:** 1  
**Master of BioMed places available:** 0

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**Orygen**  
**Using machine learning tools in psychiatric primary care to prevent psychosis**  

**Project Description:**  
Schizophrenia is a serious mental illness associated with significant health, social, and economic concerns, and it is one of the top 15 leading causes of disability worldwide. Young people may start to show signs of risk for psychosis months or even years before they receive a diagnosis. At Orygen, we founded the largest primary care network in the world for youth mental illness and risk states called 'headspace'. Over 130 sites around Australia assess thousands of young people with a range of mental health challenges. We also devised a way to determine if young people were at-risk of psychotic illnesses, like schizophrenia, that can lead to lifelong disability, but our tools are not precise enough and new approaches are needed. In this project, we will use machine learning methods to predict psychosis onset in individuals who are at-risk of psychosis using clinical data from headspace sites with the aim to translate the tools clinically through our national infrastructure. Achieving this translational goal will change care for thousands of young people and may lead to the prevention or delay of illness. The projects will involve learning and applying translational machine learning methods and implementation science approaches using pre-existing data. There will also be the opportunity to develop predictive models using clinical, brain, social, or digital biomarker data from some of the largest studies in this field globally we are currently leading (e.g., see https://www.ampscz.org/).

**Primary Supervisor:** Dr Dominic Dwyer  
**Primary Supervisor Contact:** dominic.dwyer@orygen.org.au  
**Project Site:** Orygen  
**Honours places available:** 2  
**Master of BioMed places available:** 1

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**Epigenetics as a predictor of mental illnesses: discovering methyomic subgroups for future treatments**  

**Project Description:**  
Mental illnesses are known to be the result of complex interactions between genes and the environment. Such interactions are thought to be partially mediated by epigenetic changes that switch genes "on" or "off". These switches can be detected in methyomic profiles, which have been detected to be abnormal in some individuals with mental illness and may be treatable in the future through targeted therapies. The aim of this project is to look into whether subgroups of individuals can be found with particularly high epigenetic burden for future targeted therapies. The students will use existing datasets to achieve this and will collaborate with international colleagues in
Germany (Zi Mannheim; Prof. Schwarz). The detection of epigenetic risk subgroups will lead the field towards greater understanding and more precise treatments for mental illness.

**Primary Supervisor:** Dr Dominic Dwyer

**Primary Supervisor Contact:** dominic.dwyer@orygen.org.au

**Project Site:** Orygen

**Honours places available:** 1

**Master of BioMed places available:** 1

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**Implementing precision medicine approaches for youth mental health**

**Project Description:**

Schizophrenia is a serious mental illness associated with significant health, social, and economic concerns, and it is one of the top 15 leading causes of disability worldwide. Young people may start to show signs of risk for psychosis months or even years before they receive a diagnosis. At Orygen, we have developed treatments to potentially prevent the onset of psychosis and schizophrenia. However, they are only effective approximately 50% of the time. Precision medicine techniques are needed to match young people at risk of psychosis to the therapies that they will specifically respond to. In this project, the student will build on existing methodological work to identify subgroups of young people at-risk of psychosis who respond to different treatments. The subgroups will be identified using clinical, cognitive, and brain imaging data. This work will contribute to the establishment of precision psychiatry.

**Primary Supervisor:** Dr Dominic Dwyer

**Primary Supervisor Contact:** dominic.dwyer@orygen.org.au

**Project Site:** Orygen

**Honours places available:** 1

**Master of BioMed places available:** 1

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**Individualised neurocognitive and neuroimaging trajectories in individuals at high risk for psychosis: predictors of trajectories and implications for outcomes**

**Project Description:**

There is a large degree of heterogeneity in terms of cognitive and neuroimaging profiles and trajectories observed in individuals with psychosis. However, it is unclear whether these profiles are driven by specific risk and protective factors. Furthermore, the relevance for these different profiles for later outcomes, including transition to first-episode psychosis, persistence or remission of ultra high risk status, diagnosis of other non-psychotic psychiatric disorders, and social and occupational functioning. This study will identify individualised neuroimaging and cognitive trajectories, determine the risk and protective factors that drive them, and investigate the implications of these trajectories for later outcomes.

**Primary Supervisor:** Dr Cassandra Wannan
Primary Supervisor Contact: wannanc@unimelb.edu.au

Project Site: Orygen

Honours places available: 1

Master of BioMed places available: 1

PRESIENT: a global study aiming to build tools to predict psychosis onset in young people

Project Description:

Schizophrenia is a serious mental illness associated with significant health, social, and economic concerns, and it is one of the top 15 leading causes of disability worldwide. Young people may start to show signs of risk for psychosis months or even years before they receive a diagnosis. Being able to identify people who are at clinical high risk can help clinicians treat people early before their symptoms worsen. It can also help researchers understand who is likely to develop schizophrenia, who is likely to develop other mental health conditions, and who is unlikely to experience longer-term issues. At Orygen, we are leading the largest study in the world to look for measurable indicators of illness, known as biomarkers, that can help to predict the likelihood that a person will progress to psychosis and other health outcomes. Once we have identified these biomarkers, they will be translated clinically and used in drug development pipelines. We are currently focussed on clinical, brain EEG, brain MRI, speech, and digital biomarkers. Our methods include machine learning approaches in addition to methods from dynamic systems theory. We work with global collaborators to achieve these aims within international teams. Students on the projects will learn how to identify biomarkers using advanced methods and how these results may integrate into large-scale international studies. There will be opportunities to continue in the projects after the end of the masters or honours project.

Primary Supervisor: Dr Dominic Dwyer

Primary Supervisor Contact: dominic.dwyer@orygen.org.au

Project Site: Orygen

Honours places available: 2

Master of BioMed places available: 4